

REMARKS

Claims 1 to 22 are all the claims pending in the application.

Claim 3 has been rejected under the second paragraph of 35 U.S.C. § 112 as indefinite.

The Examiner states that the meaning of the term “new centrifugal casting” is not clear.

In response, applicant has amended claim 3 to delete the word “new,” and to state that the centrifugal casting employs a tundish having a rotatable disk as described at page 12, lines 16-19 of the specification. Applicant points out that this type of centrifugal casting is described in U.S. Patent 7,014,718 which the Examiner has cited. The rotatable disk in claim 3 refers to the rotating body 5 described in U.S. Patent 7,014,718.

In view of the above, applicant submits that claim 3 complies with the requirements of the second paragraph of 35 U.S.C. § 112 and, accordingly, requests withdrawal of this rejection.

The Examiner has indicated that claims 3, 4 and 5-7 contain allowable subject matter. Accordingly, applicant has amended claims 3 and 5 to place them in independent form. In view of these amendments, applicant submits that claims 3-7 are allowable.

Claims 8-12 have been rejected under 35 U.S.C. § 102(b) as anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as obvious over U.S. Patent 4,582,535 to Buschow.

Applicant submits that Buschow does not disclose or render obvious the subject matter of claims 8-12 and, accordingly, requests withdrawal of this rejection.

The present invention, as set forth in claim 8, is directed to a rare earth (RE)-containing alloy which is obtained through the method of any one of claims 1-4.

Claim 9 is directed to an RE-containing alloy represented by formula $R(T_{1-x}A_x)_{13-y}$, and which comprises an R-rich phase and an R-poor phase wherein the R-rich phase and the R-poor phase are dispersed at a phase spacing of 0.01 to 100 μm .

Claim 10 is directed to an RE-containing alloy represented by the formula $R(T_{1-x}A_x)_{13-y}$ wherein the alloy has an NaZn_{13} phase content of at least 90 volume %.

The Examiner states that the present claims differ from Buschow in that Buschow is silent with respect to the crystal structure recited in the present claims, and that Buschow does not teach the process recited in the product-by-process claim 8.

The Examiner asserts that the invention as set forth in claims 8-12 would have been obvious because the example alloys in Buschow have compositions that are encompassed by the present claims. The Examiner asserts that the example alloys in Buschow would be expected to possess all the same properties as recited in the present claims.

In response, applicant submits that the mere fact that the alloy compositions of Buschow have compositions that are within the scope of the formula of the present claims does not mean that the alloys, in fact, are the same. As discussed in the present specification, and as can be seen from the examples therein, alloys that have the exact same composition, but produced by different methods, have different properties and are not the same.

Thus, Example 1 of the present specification discloses the production of an $\text{La}(\text{Fe}_{0.88}\text{Si}_{0.12})_{13}$ produced by a strip casting method, in which the alloy was rapidly quenched with a cooling rate in the temperature range of 1600-900°C of about 1×10^3 °C/sec. The alloy strip sample was found to have a minute microstructure in which an R-rich phase had a size of 5 μm or less and an R-poor phase had a size of 10 μm or less. The R-rich phase and R-poor phase

were uniformly dispersed at a phase spacing of 0.01 to 100 μm . The alloy had an NaZn_{13} phase content of at least 90 volume % after heat treatment.

In contrast, in Comparative Example 1, a molten alloy having the same composition as in Example 1 was prepared, except that the alloy was produced through a book mold method in which the alloy was allowed to stand for three hours for cooling to 50°C. As set forth in Comparative Example 1, the alloy produced through the book mold method had a considerably coarse alloy microstructure as compared with that of the alloy of Example 1 produced through rapid quenching. In addition, the alloy of Comparative Example 1 included three or more phases. That is, it had an R-rich phase, an R-poor phase, and one or more other phases, with each phase having a size of 100 μm or more.

In Buschow, the alloy is produced by forming a melt from the required starting components, cooling the melt, and subjecting the resulting molding to a temperature treatment at a temperature in the range of from 800 to 1,000°C, succeeded by accelerated cooling to room temperature. Buschow does not disclose the specific method for forming the melt, and does not disclose any of the conditions for cooling the melt. As can be seen from Example 1 and Comparative Example 1 as discussed above, the cooling conditions that are employed will result in different products. Since Buschow does not disclose the cooling conditions for his alloy, applicant submits that Buschow does not disclose or suggest the alloy set forth in claim 8, which requires the specific cooling conditions.

Further, Buschow does not disclose or suggest the alloy of claim 9 which has a phase spacing of 0.01 to 100 μm for the dispersing of the R-rich phase and the R-poor phase. Again, as can be seen from Example 1 and Comparative Example 1, the use of different conditions results

in alloys having different phase spacings. As set forth in the present specification at page 7, lines 4 to 9, the size of the R-rich phase and the size of the R-poor phase are equivalent to the phase spacing of these phases. Example 1 and Comparative Example 1 show that the sizes of the R-rich phase and R-poor phase that did not employ the cooling method of the present invention did not achieve the phase spacing set forth in claim 9.

With respect to claim 10, applicant refers the Examiner to Example 2 and Comparative Example 2 of the present specification. Example 2 and Comparative Example 2 differed in the cooling rates, but both produced an $\text{La}(\text{Fe}_{0.89}\text{Si}_{0.11})_{13}$ alloy having an NaZn_{13} structure, but in Example 2 the amount of the NaZn structure was 93 mass%, whereas in Comparative Example 2 it was 54 mass%. Since Buschow does not disclose the cooling rates, there is no reason to believe that he would attain an alloy with an NaZn_{13} phase content of at least 90 volume %.

In view of the above, applicant submits that Buschow does not disclose or render obvious the subject matter of claims 8-12 and accordingly requests withdrawal of this rejection.

Claims 1 and 2 have been rejected under 35 U.S.C. § 103(a) as obvious over the article by Fujita et al.

Applicant submits that Fujita et al do not disclose or render obvious the subject matter of claims 1 and 2 and, accordingly, requests withdrawal of this rejection.

The Examiner recognizes that the present claims differ from Fujita et al in that Fujita et al do not teach the heating temperature or the cooling rate recited in process claims 1, 2 and 5. (Applicant notes that although the Examiner refers to claim 5 in the detailed statement of this rejection, applicant assumes that the Examiner inadvertently referred to claim 5 because the Examiner in Paragraph 8 of the Office Action indicated that claim 5 would be allowable if

rewritten in independent form and the Examiner did not include claim 5 in the initial statement of the rejection.)

The Examiner argues that the present invention would have been obvious because there is nothing to indicate that the claimed heating temperature and cooling rate in any way differ from the heating temperature and cooling rate encountered in the Fujita et al process of atomization.

As the Examiner notes, the Fujita et al reference is discussed in the present specification, where it is disclosed that the Fujita et al method comprises arc melting raw material metals to form an alloy ingot, heating the alloy ingot at 1,000 to 1200°C for 240 hours to 1,000 hours to thereby form a mother alloy, remelting the mother alloy, atomizing the reformed molten alloy in an atmosphere for cooling to thereby produce spherical particles.

As the present specification points out, the Fujita et al method includes a long term heating treatment and two melting steps and as a result production costs increase and the oxygen content of the alloy increases even though low cost materials are employed.

Fujita et al do not disclose or suggest the rapid quenching of an alloy composition that has been produced by melting alloy raw materials. Fujita et al do not disclose any cooling information for the cooling of the alloy ingot which is made from the raw material to form a mother alloy. In Fujita et al, this mother alloy is remelted, and the remelted alloy is atomized. Thus, the atomization occurs in the second melting step of Fujita et al. Fujita et al do not provide any information concerning the cooling temperature of the first melting step.

Further, there is nothing to indicate that the atomizing in Fujita et al is performed at the cooling rate set forth in the present claims. As can be seen from Example 1 and Comparative Example 1 of the present application, different cooling rates can be obtained during cooling.

There is nothing to teach or suggest that the atomizing in Fujita et al would result in the cooling rates of the present claims.

In view of the above, applicant submits that Fujita et al do not disclose or render obvious the presently claimed invention as set forth in claims 1 and 2 and, accordingly, requests withdrawal of this rejection.

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

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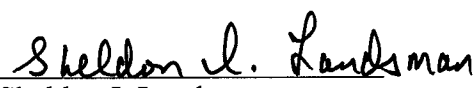
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